Physical Facilities and Program Equipment: In the past 10 years, we have obtained more than $3 million in funding to develop a comprehensive network of rehabilitation safety research labs. These labs occupy 5000 square feet of space and greatly increase the scientific rigor of our studies. The labs also as serve as a magnet to attract researchers, students, fellows, and faculty from our affiliate University as well as other federal and non-federal research facilities and national and international universities.

***Dynamic Human Motion Analysis Lab*:** This lab occupies 1,200 square feet and is equipped with a 13-camera Vicon MX motion capture system, a 16-channel Delsys EMG system, three AMTI force plates, eight AMTI load cells, and a BLAST isokinetic leg press strength testing and training device. It also contains a custom-built apparatus to calibrate EMG amplitude to muscle force. This lab also has an overhead fall arrest system and an traverse ceiling-mounted patient lift system. This lab is directed by an ergonomist and staffed with a biomedical engineer, a biomechanist and graduate students.

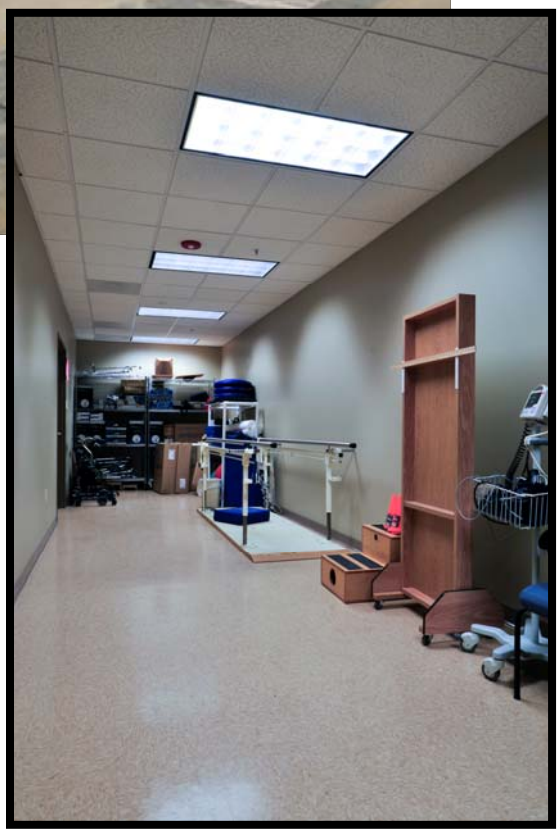
The surfaces shown here are to investigate mechanisms of fall recovery on challenging surfaces. Kinematic and kinetic measures of subject performance while negotiating visible obstacles will evaluate feedforward mechanisms, while performance while negotiating hidden obstacles will evaluate feedback mechanisms. Control (i.e. flat) surfaces and multiple gait speeds will be tested. Additionally, functional strength and coordination will be assessed via an isokinetic leg press and kinematic and kinetic measures of a lunging task.

The **Engineering Research and Fabrication Laboratory** (ERFL) provides engineering support for the Center and conducts mechanical/biomedical based research projects to examine technological defenses and prevent mobility-related adverse events. The lab occupies 1,100 square feet of space and contains industrial size metal machine tools including a geared head engine lathe, a vertical milling machine, an adjustable height drill press, a horizontal/vertical band saw, a bench grinder, a MIG welder, a metal cut-off saw and an arbor press. Additionally, the lab is stocked with a vast assortment of hand tools, cutting bits, mechanical fasteners, and raw stock material consisting of metal, wood and plastic. A separate room within the lab contains key wood working tools such as a compound miter saw, a table saw, a scroll saw, and an assortment of powered hand tools. This new woodworking room also contains an independent cyclonic dust collection system and overhead vent fans to minimize the effects of dust and fumes. Additionally, this lab houses state of the art testing equipment to perform mechanical/biomedical research and product evaluations. This sophisticated data collection equipment includes; a 9’ Instron high velocity impact tower, a Com-Ten, twin column, floor based universal testing machine, and handheld meters to measure moisture, sound levels, and applied forces. This lab is staffed with two mechanical engineers and graduate students, with additional access to USF faculty in electrical, computer and biomedical engineering. The lab has recently completed a comprehensive mechanical evaluation into the protective properties of hip protectors with results leading to design changes by product manufacturers. Current studies entail the development and testing of patient helmets, assessing the protective properties of safe flooring materials (i.e. fall mats) and evaluating technologies to prevent wandering behaviors in those with dementia.

Treadmill Lab occupies 170 square feet and has a standard research-grade treadmill and an ActiveStep treadmill, which assesses and trains the recovery of falls after slips and trips by repeatedly slipping and tripping patients in a safe environment (in a safety harness). This treadmill assesses fall risk by recording six quantitative predictors of the ability to recover from lab induced trips, based on data from a torso mounted triaxial accelerometer and GaitRite mat beneath the treadmill belt. These predictors are calculated in real time within seconds of a trial to give real-time feedback to the therapist of trial performance.

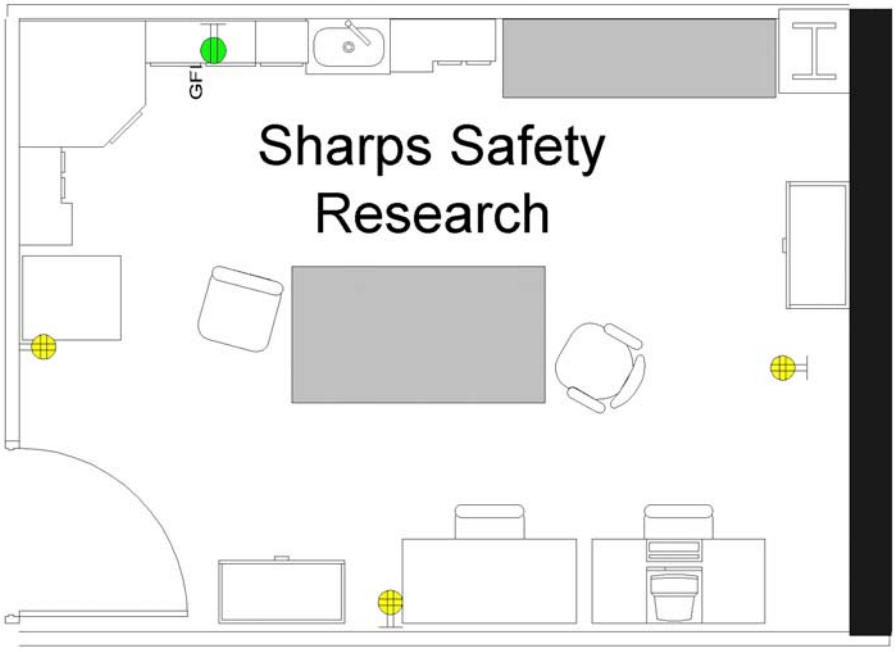
***Gait and Balance Lab* 1** occupies 1,300 square feet and is used to conduct complex clinical evaluations of gait patterns, balance reactions, and postural control. The capabilities of this lab include a 6-camera Vicon 460 motion capture system with three in-floor force plates for dynamic assessment of gait, a Biodex System 4 Pro neuromuscular evaluation device, a a GaitRite walkway system, a NeuroCom SMART Balance Master with an additional long force plate to train and quantify balance, as well as therapy equipment. We have designed a modular obstacle course with sections suitable for a range of healthy and impaired subjects. These obstacles include ramps, stairs, stumbling obstacles, surface height changes, uneven/irregular surfaces, and particulate/compliant surfaces. The lab has been equipped with two overhead Solostep fall arrest systems for safety. This lab is staffed with two PTs, a biomedical engineer and graduate students.

Clinical Gait and Balance Lab 2 occupies 400 square feet and houses standard therapy equipment to allow for the objective clinical assessment of gait and balance disorders. This space is used to perform in depth functional evaluations for the Tampa VA Falls Clinic as well as deliver specialized gait and interventions to its patients.



***Locomotor Training Lab*:** This new lab is equipped with a Lokomat, a robotic gait orthosis to retrain gait in neurologically-impaired subjects. This device will be equipped to enable manual training as well as robotic if that is optimal for the specific patient or research study.

Sharps Safety Research Laboratory: This laboratory, which occupies 285 square feet, provides testing and evaluation of a variety of sharps devices, designed to prevent, detect, or mitigate injuries and exposures among healthcare workers and patients VHA-wide. The purpose is to develop a VA-wide center for testing and evaluation of sharps technologies with the goal of standardization to determine optimal devices. This laboratory is staffed by a nurse scientist with a doctorate in Occupational Health, a mechanical engineer, and graduate students. Research foci for the core investigators are: 1) evaluation of blood splatter from phlebotomy devices and intravenous catheters and 2) determination of ergonomic forces required to activate retractable syringes. Access to larger space will facilitate testing a greater variety of products as well as an increased number of parameters



***Non-Invasive Skin Perfusion & Ischemia Detection Lab*:** This new lab will use new and emerging technologies for pressure ulcer assessment/ prevention, as well as to monitor pressure ulcer healing. Currently, the lab possesses the capability for skin blood flow measurement by laser Doppler velocimetetry, and several pressure mapping devices. We also have access to high-frequency ultrasound and Moisture Meter, and locally-developed microwave spectroscopy and impedance plethysmography. The lab will evaluate detection of edema using MicroElectronic Mechanical Systems (MEMS) technology developed by collaborating investigators at USF to monitor a wide variety of physiological parameters. The lab is staffed with a physician, and graduate students. We will be adding another physician scientist and a biomedical engineer. We have a vibrant cooperation with USF, which has received an NSF center grant on using skin as a bioengineering interface. To the best of our knowledge, there are no other such labs in the VHA.